

ABILITY OF STUDENTS WITH REFLECTIVE AND IMPULSIVE COGNITIVE STYLES IN WRITING A SCIENTIFIC ARTICLE

Imas Cintamulya

The present study focuses on making the students aware about various environmental issues by using case studies. The ability of students to reveal their findings about environmental issues has been developed through scientific literature, one of which was writing scientific articles. Each student has a different thinking style or cognitive style, so the possibilities in terms of scientific writing can be different. A cognitive style is shown in individuals receiving, processing and organizing information, and presenting the information based on the experiences they have had. This study aimed to describe the ability of the students who have a reflective or impulsive cognitive style to write a scientific article as a result of employing case studies on environmental issues. To achieve these objectives, the research involved the students of biology education UNIROW Tuban class of 2011. The ability to write scientific articles was analysed descriptively and included: title, credit lines, abstract, introduction, methods, results and discussion, conclusions and bibliography. To measure the reflective vs impulsive cognitive styles, the study used the MFFT (Matching Familiar Figure Test) instrument which was designed and developed by Warli (2010). The results showed that the ability of students who had a reflective cognitive style to write scientific articles tended to follow the rules, except when they were writing a bibliography. Therefore, there was a difference between students who write with a reflective cognitive style and students who write with an impulsive cognitive style in terms of their ability to write a scientific article as the result of case studies about environmental issues.

KEYWORDS: Cognitive Style, Case Study, Environmental Issues, Impulsive, Reflective.

INTRODUCTION

Writing a scientific paper is a usual activity of the students in the learning process in a college. The activity is useful to train students in thinking skills to develop a scientific temper. The scientific papers are written by the students for fulfilling the tasks as prescribed in the course. Along with the development of science, students are also required to have skills of writing scientific papers in the form of scientific articles. The scientific article is a written work which is designed to be loaded in a journal or a book and is a collection of articles written by a scientific procedure and follows scientific guidelines that have been established (Siahaan, 2012). As per the demands of the development of science today, it is generally necessary to develop the ability to write scientific articles in students and especially in students of biology education of University PGRI Ronggolawe Tuban class of 2011.

Empowering students to write scientific articles is done through the course on conservation and environmental knowledge. This course discusses the various environmental problems that occur at this time. So, the topic for writing scientific articles can be selected based on the environmental issues. For this purpose, a lesson on the course of conservation and environmental knowledge was designed by applying the case study method. The case study method is a method that compares the lecture material to analyse the problems that are currently occurring (Anggraeni, 2012). Application of the case study method in the course of conservation and environmental knowledge, mainly aimed to: 1) train students in analysing environmental problems and 2) train students to write a report of a case study in the form of scientific articles.

Another thing to consider in studying the course on conservation and knowledge of environment is the cognitive styles of students. According to Ginther (1999), cognitive style is a characteristic that is fixed in the individual in terms of feeling, remembering, organising, processing, thinking, and solving problems. According to Froehlich (2003), cognitive style is a characteristic that tends to remain in a person's personality. Kogan (1970) explains that the cognitive style is an individual's variation of how to feel, remember, think, or as a way to distinguish, understand, store, embody, and use information. If the students' styles in learning are accommodated, then it can improve the learning outcomes, thinking skills, academic achievement, and creativity (Acharya, 2002).

According to Jerome Kagan (1965), cognitive styles cover impulsive and reflective cognitive styles. Someone who has an impulsive cognitive style, would have a characteristic of answering quickly but is careless as the answers tend to be wrong. Whereas, someone who has a characteristic of being slow in

responding to the problem, but careful and thorough while answering the question then someone can be said to have reflective cognitive style (Warli, 2010).

With reference to some opinions above, it can be said that the way students understand, utilize the information, organize, process, and think in the learning process is dependent on their cognitive styles. Therefore, the question arises, is there difference in the ability to write a scientific article about the results of a case study about environmental issues between students who have reflective cognitive style and impulsive cognitive style? The results of this study may have the following benefits: 1) it may contribute knowledge about the ability to write a scientific article as viewed from reflective and impulsive cognitive styles and 2) it may help in designing learning models that can empower the ability to write a scientific article with regards to reflective and impulsive cognitive styles.

RESEARCH METHODOLOGY

The research methodology used for the study includes 1) pre-experimental research with One-Shot Case Study design (Sugiono, 2008) aimed to develop the ability to write scientific articles; 2) explorative research that aimed to reveal reflective and impulsive cognitive styles of the student and 3) comparative research that aimed to see the difference in a student's ability to write scientific articles with regards to reflective and impulsive cognitive styles. Research subjects are students of Biology Education class of 2011 that use reflective and impulsive cognitive styles.

The instrument used to collect data about students' ability to write a scientific article is the observation sheet. While the instrument used to measure the reflective and impulsive cognitive styles was the MFFT (Matching Familiar Figures Test) which was designed and developed by Warli (2010). MFFT instruments include one standard image and eight variation images. Through this instrument, the students are asked to choose one of eight images of variation which is the same as the standard image. The variables measured were the time required by students to answer the first time and the frequency of the students reply to produce the correct answer.

This research was conducted with 33 students of Turban class of 2011 in learning conservation and environmental knowledge course. The research was conducted in two phases. The first phase of the study involved measuring the cognitive styles and the second phase of the study was to determine the ability to write a scientific article. Data for the first phase of the research was taken in 2014 (Cintamulya, 2014). Research to understand a student's ability to

write scientific articles, was implemented through the use of cooperative learning along with the case study method. Meanwhile, the assessment of the ability of writing scientific articles was conducted at the end of the lecture on conservation and environmental knowledge.

The research study to measure the cognitive styles include the following steps: 1) the students completed a test of cognitive style through the MFFT instrument, by finding a picture of variation in accordance with the standard image; 2) recorded the time spent by the students to answer the first problem; 3) recorded the frequency with which the student gave correct answer; 4) calculated the amount of time and frequency in error which was then divided by the number of items to obtain the average; and 5) determined the median of time (t) and the frequency (f). According Warli (2010) the students were divided into four groups which included: 1) students who were quick in answering the question and gave response carefully/thoroughly so the answer was always right; 2) students who were slow in responding to the problem and gave responses carefully/thoroughly so that the answers were always right (reflective students); 3) students who were prompt in replying but were less accurate/less thorough such that their answers were often wrong (impulsive students) and 4) students who were slow in responding to the problem and were less accurate/less such that their answers are often wrong. This study was limited only to the student who have a reflective and impulsive cognitive styles.

The steps of a study to determine the ability to write a scientific article were as follows: 1) divided the students into ten groups, with each group consisting of 3-4 students; 2) chose the topics on environmental problems that occur in Tuban; 3) gave assignments to each group to collect data, according to their selected topic and for this activity they were given about three weeks; 4) evaluated the results of the case study through presentations in class as a group; 5) explained how to write scientific articles; 6) gave assignments to the students to write scientific articles individually, according to the topics presented; and 7) evaluated the scientific articles at the end of the lecture, using the instruments developed for the study.

RESULTS AND DISCUSSION

To measure of cognitive styles, the study used MFFT (Matching Familiar Figures Test) instrument with the observed variables consists of the time required by students to answer the question and the frequency of students replies to produce the correct answer. A summary of the results are presented in Table 1. While the results of the analysis of data on students' ability to write a scientific article can be seen in Table 2.

Table 1
Summary of Results of Measurement of Cognitive Style.

Class	Number of Student s	Time			Frequency			Number of Reflective Student s	Number of Impulsive Student s
		Max	Min	MED	Max	Min	MED		
2011	33	73.18	5.68	14.7	4.23	1.62	2.69	11	11

Table 2
Results of Measurement of Students' Ability to Write Scientific Articles on Environmental-related Problems Between Reflective and Impulsive Cognitive Styles.

COMPONENT	STUDENTS' REFLECTIVE COGNITIVE STYLE	STUDENTS' IMPULSIVE COGNITIVE STYLE
THE WRITING OF THE TITLE		
a. Does the number of words in the title meet the criteria set?	The number of words in the title meets the criteria set.	The number of words in the title does not meet the criteria set.
b. Is the title described briefly to its essay core and according to its problems?	The title described briefly to its essay core and according to its problems.	The title is still too wide and it is not according to the core of the problem
c. Is the title attractive?	The title is quite attractive	The title is less attractive
d. Is the title proper, correct, logical, thorough, informative/ indicative?	The title is quite informative	The title is less informative
WRITING CREDIT LINE		
a. Is writing line of credit according to the rules?	Writing line of credit is according to the rules	Writing line of credit is already according to the rules
ABSTRACT AND KEYWORDS		
a. Does the abstract already contains components of IMRAD? (introduction, methods, results and discussion)?	Abstract already contains introduction, methods, results and discussion.	Abstract only consists of Introduction and methods.
b. Does the abstract already follows the rules that apply in terms of length or style of writing as well as one unified of ideas?	Abstract reflects one unified ideas.	Abstract does not reflect one unified idea.
c. Is abstract informative/ indicative?	Abstract is informative	Abstract is uninformative

INTRODUCTION		
a. Does the introduction contains reason to do research, hypotheses and research purposes?	The introduction contains reason to do research and research purposes	The introduction contains only research purposes. Whereas the reason to do research is less appropriate with the problems
b. Does the introduction contain formulation of the problem?	The introduction contains formulation of the problem.	The introduction does not contain formulation of the problem.
c. Does the introduction contain description of state of the art research?	The introduction does not contain description of state of the art research.	The introduction does not contain description of the state of the art research.
d. Does the introduction contain the thought of writing on issues?	The introduction does not contain the thought of writing on issues.	The introduction does not contain the thought of writing on issues.
MATERIAL AND METHODS		
a. Are the material and methods used described in detail?	The material and methods used are not described in detail	Method is quite clear
b. Does the method describe the way and sampling frequency?	The method does not describe the way and the frequency of sampling	The method does not describe the way and the frequency of sampling
RESULTS AND DISCUSSION		
a. Were the results of the study presented in a graphic or image (for a lot of data)?	The results of the study are presented using images.	The results of the study are presented using images
b. Are results of writing conducted systematically i.e. which starts from the main results and followed by a supporter?	Research results have been written systematically.	Research results have not been written systematically.
c. Is the language used clear and coherent?	The language used is quite clear.	The language used is less clear
d. Is the discussion directed to the hypothesis (to refuse or receive hypothesis)?	Discussion is in accordance with the problem.	The discussion was not relevant to the problems
CONCLUSION OR IMPLICATIONS		
a. Does the conclusion answer the problem?	The conclusion answers the problem.	The conclusion does not answer the problem
b. Is conclusion based on the facts found in the study?	The conclusion is based on the facts found in the study	The conclusion is not based on the facts found in the study.

ACKNOWLEDGMENT		
a. Does the author write acknowledgements?	The author does write acknowledgments	The author does not write acknowledgments
WRITING REFERENCES		
a. Do the References contain the author's name, year of publication, title, source, and page?	The References contain the author's name, year of publication, title, source, and page.	The References contains the author's name, year of publication, title, source, and page.
b. How is the layout of the article?	Many mistakes in typing	Many mistakes in typing
WRITING TABLE		
a. Is the data presented in the tables?	Data is not presented in the tables	Data is not presented in the tables

Based on the summary of the results of measurements of cognitive style given in Table1, there are two observed variables, namely time and answer frequency. Time shows the duration the student took to answer first, and answer frequency indicates the number of times students answered, to obtain the correct answer. Based on Table1, the maximum time it takes a student is 73.18 seconds and the minimum time is 5.68 seconds. While for answering frequency, maximum is 4.23 and the minimum frequency is 1.62. Median of time and frequency response is used as the limit for classifying students who have the characteristics of a reflective and impulsive cognitive style. Results were obtained from grouping students' in reflective cognitive style, a total of 11(33.3%) and students who are in cognitive reflective style, total of 11(33.3%). It shows that the proportion of students who have reflective and impulsive cognitive style are larger in number (66.6%). While the remaining 33.4% is the number of students who have the characteristics of being fast and precise / accurate in answering or slower and less precise / less accurate in answering. From several previous studies the proportion of reflective and impulsive children is greater than the group of children who respond quickly and carefully and slowly and carefully. Rozencwajg and Corroyer (2005) found the proportion of children reflective and impulsive to be 76.2%, which is similar to research done by Warli (2009) where in the number of such students was 73.8%.

Based on Table 2 students who had reflective cognitive style in the ability to write a scientific article have been found to be better than the students who have impulsive cognitive style. Based on the scientific article which has been written by the students that students with reflective cognitive style have met seven of the nine components of the criteria of scientific article writing. The seven

components include: 1) the writing of the title; 2) abstract and keywords; 3) introduction; 4) materials and methods; 5) results and discussion; and 7) bibliography. As for the impulsive cognitive style only 5 components are met and only some aspects of each component are met. The five components are: 1) abstract and keywords; 2) introduction; 3) materials and methods; 4) results and discussion; and 5) bibliography.

Through analysis of these components, we can see that students who have reflective cognitive style, they are more thorough and more careful in writing a scientific article than the students who have impulsive cognitive style. This condition is in line with the psychologists who say that there is a relationship between the style of the writer and their cognitive style with personality. This situation as described by Kagan and Kagan (1970) relates to a person who has reflective cognitive style who would be very cautious in responding to something, considers it carefully and take advantage of all the alternatives. But the time taken to respond is relatively long, but the error is relatively small. Based on the results of research, it appears that students with reflective cognitive style write better articles than impulsive. Besides these differences are supported by Brown's opinion (1980) which states that a person who has reflective cognitive style has more use of contemplation and consideration while impulsive cognitive style is more likely to quickly grind to speculate or gamble. In other words, one who has reflective cognitive style tends to use better language than impulsive groups who tend to be careless. Selinker and Jeffrey (1976) found that those who have reflective cognitive style, they are better at doing tasks that require detailed analysis while those who have impulsive cognitive style are better at tasks that require the attention of the outer contour of the object and global comparisons.

Furthermore, Reynolds and Jansen (2007) explain that a person who has reflective cognitive style usually takes a long time to respond, but considers all the options available and has high concentration while studying. The impulsive on the other hand lack concentration. So, it can be seen that a person who has reflective cognitive style, will have more concentration and tend to use a lot of information in solving the problem rather than an impulsive person. So, basically the difference between reflective and impulsive cognitive styles lies in the tendency to reflect or think about alternative solutions to a problem, or a tendency to take impulsive decisions, in the face of problems that have very uncertain answer.

Based on the indicators of critical thinking by Elder (2007) students' scientific articles that are based on reflective cognitive style, have met the clarity indicator for some components. This means that students who possess

reflective cognitive style have clarity in thinking by providing information for several components clearly. Clarity in writing scientific articles are important, it is as stated by Tarigan (1986) that the purpose of writing can be achieved if the author can organize his/her thoughts and speak them clearly. Clarity indicator is important, for example in the writing of the title as the title in a scientific work, occupies an important place. As put forward by Rifai (2012) the title should serve as bait to attract people's attention and can be useful as a source of inspiration for advancing knowledge through further activities. In other words, if the title is created with a clear and compelling language it will attract people to read it.

In addition to indicators of clarity, scientific articles written by students having cognitive reflective style also meets the indicators of critical thinking (Paul & Elder, 2007). This means that a critical thinker is able to provide information which is specific, detailed, and also correct.

CONCLUSION AND SUGGESTION

The quality of students' scientific articles that reflective cognitive style has met several indicators of critical thinking namely clarity and precision. Based on this, it can be concluded that students who have a reflective-cognitive ability of writing scientific articles are better than students who have impulsive cognitive style. As for further research on reflective cognitive style and impulsive cognitive style it is recommended to view the differences on other aspects such as metacognition, creative thinking, academic achievement, problem solving, and understanding of the concept.

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